

Faiveley DT Xebra Mobile DVR



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Glossary

CCTV	Closed Circuit Television
GPS	Global Positioning System
FIFO	First In First Out (old data erased by new data)
MTBF	Mean Time Between Failures
SAE	Vehicle scheduling control system (Système d'Aide à l'Exploitation)
TMS	Train Management System

XEBRA, the video recorder you can rely on

XEBRA is a stand alone CCTV video recorder designed for the most demanding on-board applications

Thanks to its adaptability and reliability, XEBRA is the best product for a variety of applications such as:

Prevention of vandalism

Help in **identifying** aggressors

Help in determining **responsibilities**
in event of incidents

Surveillance of **doors** during vehicle stops

Surveillance of **tracks** and **signalling systems**

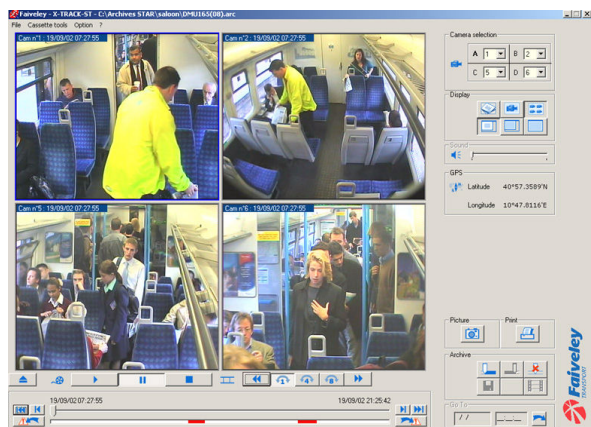


Simplicity

Simplified setup and installation using any PC thanks to an embedded Web server



Instant on-board image read out with X-TRACK playback station – data transfer by extraction of the HD cartridge, Ethernet connection to a PC, or radio transmission



Performance

High quality pictures

Recording capacity: up to 25 frames per second

Very good **performance/volume** ratio

Adaptability

Suitable for **all mass transit vehicles** (by rail or road)

Standard product, **easy to implement** in a complete system using proven technologies (Ethernet communication, MPEG4 compression)

Wide range of options: Sound recording, double disk cartridge, radio transmission, GPS communication interface

Security

Reliability: Rugged product, hard disk service life guaranteed by careful production, recommended handling precautions and shock detectors installed on each HD cartridge

Confidentiality of recorded data: HD cartridge locked on the recorder, playback software protected by passwords, proprietary recording format

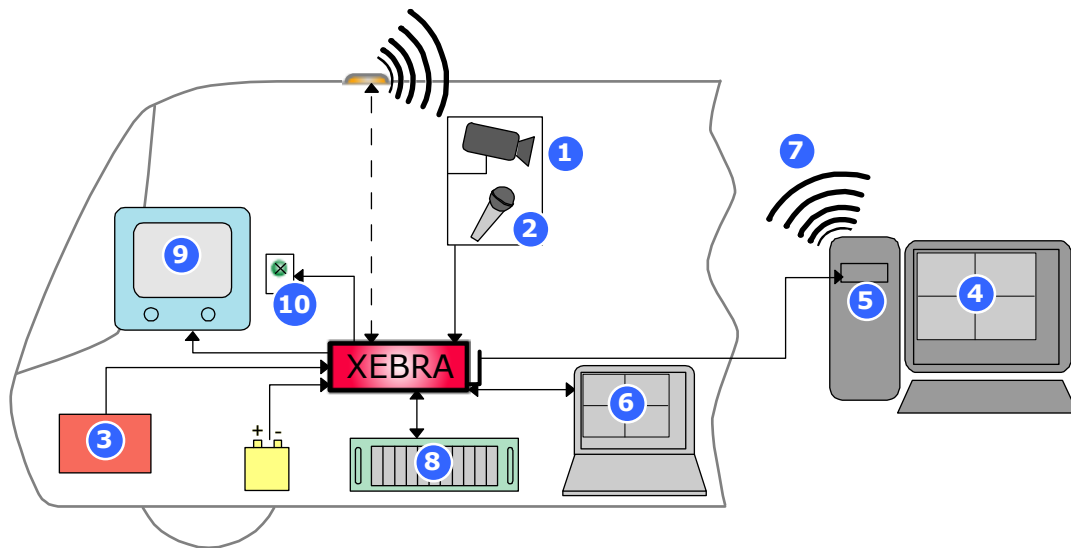
Compliance with rail and road **standards:** EN 50155, EN 50121, ISO 16750-2, ISO 7637, IEC 61373

Design and production quality is guaranteed by Faiveley Transport's **ISO 9001** certificate.

XEBRA in detail

1 XEBRA, the heart of your CCTV system

The XEBRA video recorder can be the main part of any video surveillance system installed in a mass transit vehicle on rail or road.



XEBRA **records** video sequences (up to 12 cameras **1**) and sound **2**, and a high quality recording in “alarm mode” can be activated by a digital input **3**.

Reading of data recorded on HD cartridges, as well as storage and processing of video sequences make use of the X-TRACK playback station **4**. Data are transferred from the recorder to the playback station by insertion of the HD cartridge in the station **5**, connection of a PC equipped with X-TRACK software **6** to the recorder, or radio transmission **7** (option) between XEBRA recorder and playback station.

The **system** may also include:

- a GPS, SAE or TMS **8** in order to receive information (date, time, position, vehicle identification, etc.) and to signal alarm activation
- a display **9** showing images from the cameras
- an external fault indication light **10**

An embedded **Web server** allows configuration and verification of the recorder status and of the status of connected devices using a laptop PC equipped with an Internet browser **6**.

2 Efficient processing of recorded sequences

X-TRACK software is designed to process easily video and sound sequences recorded on the HD cartridge.

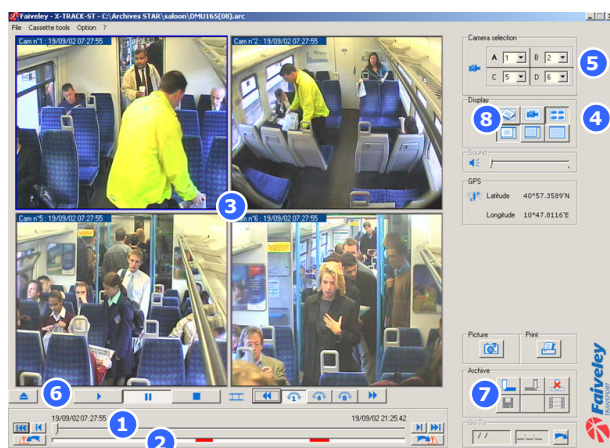
2.1 Various ways to access data

Recorded video sequences can be read in three different ways:

- extraction of the HD cartridge from the recorder and insertion in the X-TRACK playback station
- connection of a laptop PC equipped with X-TRACK software to the recorder's Ethernet plug
- remote connection of a PC equipped with X-TRACK software if the recorder is connected to a radio module (option)

In order to ensure data confidentiality, X-TRACK software is password protected. Several user profiles can be defined and some software functions can be restricted according to the authorised access level.

2.2 X-TRACK, a powerful and user-friendly software



Search

A time-related browser bar **1** indicates the beginning and the end of the session on the HD cartridge and allows sequences to be viewed according to the recording time and date.

An alarm bar **2** displays sequences recorded in alarm mode if the video flow contains alarm incidents.

Display

The decoded video sequence is displayed in a special window **3**. Several pre-set formats **4** are available. The quadravision mode is also available to display images simultaneously from 4 cameras.

A tool **5** allows quick selection of the camera(s) to be displayed in each window.

Browsing

A video control bar **6** provides a large selection of replay speeds (forward and backward), and the usual start, stop and pause functions.

Storage

A control tool box **7** allows transfer of sequences from the HD cartridge to the station's hard drive (or any other storage device) as well as recording and printing of single pictures.

Video sequences can be exported in AVI.

Single pictures are exported in JPG or BMP.

Service functions

A logbook **8** can be displayed on request. It contains operating details (vehicle number, train number, etc.) internal data (version of recording software) and a list of the alarms, faults or dated external incidents.

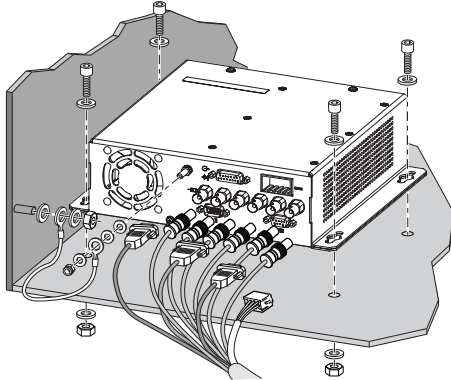
The menu also provides maintenance operations on the HD cartridge such as complete erasing, memory test, etc.

3 Guaranteed performances

Compressor:				
Number of frames per second	12 or 25 frames/			
Compression format	MPEG4			
Image quality	4 compression levels			
Metadata:				
Time stamping	Date and time – management of summer / winter time			
Data storage:				
Hard disk size	40 Gb or more, contact Faiveley for more details			
Recording time	24h, 72h or 168h (see details page 11)			
Normal recording mode	FIFO (old data are erased by new data)			
Alarm recording mode	5 alarms saved (see details page 11)			
Recording format	Proprietary			
Mechanical protection of data	Key lock			
Video and sound inputs / outputs				
Video inputs / outputs format	PAL / NTSC colours or black and white			
XEBRA models	4 cameras	6 cameras	8 cameras	12 cameras
Number of video inputs	4	6	8	12
Number of video outputs	1	1	1	1
Number of sound inputs	0	1	0	1
Output for camera supply:				
Output voltage	12 V ± 1 V			
Available power	12 W			
Power supply:				
XEBRA models	24V	24-52V	72-110V	
Applications	Road vehicles	Rail vehicles	Rail vehicles	
Input voltage	24V	24V, 36V, 48V, 52V	72V, 96V, 110V	
Power input	50 W	50 W	50 W	
Environmental conditions:				
Operating temperature	-25°C to +70°C EN50155 Class T1 Video recording conditions are compliant with technical specifications for the use of hard disks			
Hard disk operating temperature	+5°C to +55°C			
Humidity	8% to 90% without condensation			
Enclosure:				
Protection	IP 20			
Cooling system	Internal fan			
XEBRA models	4 and 6 cameras		8 and 12 cameras	
Dimensions	265 x 260 x 80 mm		265 x 260 x 100 mm	
Weight (with HD cartridge)	3.5 kg		3.7 kg	

4 Quick and safe commissioning

4.1 Easy installation



The recorder is fastened by four screws / nuts of the M6 type.

The ground stud of the recorder must be connected to the vehicle ground.

Cables are connected to the back of the recorder. So as to prevent errors when connecting cables, all connectors are different and polarised (except video connectors).

4.2 Quick configuration

Recorder configuration requires connection of a laptop PC to the RJ45 plug on the recorder's front panel. An Internet browser (such as Firefox or Internet Explorer) gives access to the embedded Web site in order to configure the recorder.

Adjustable data:

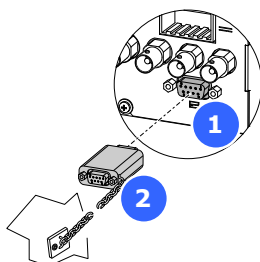
- number of cameras (up to 12) and black image detection level
- recording parameters
- choice of camera displayed on video output
- recording date and time
- vehicle identification information
- recorder identification information

Configuration of several recorders:

A menu saves the configuration of the recorder on a PC in order to repeat exactly the same configuration on several recorders.



4.3 Configuration key (option)

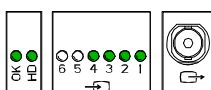


As an option, a connector ① on the back side of the recorder can be connected to a configuration key ② attached to the vehicle. It contains all configuration data concerning XEBRA operation in this vehicle (number of cameras, compression rate, number of frames per second, customer data, etc.).

This configuration has priority over the configuration already in the recorder, so it allows the recorder to be replaced without having to be reconfigured.

4.4 System continuous self-test

Once installed and configured, the recorder continuously monitors the video signal of each camera. If the signal from a camera is lost, the system activates its fault indication output. Self tests are also performed on internal parts of the recorder (hard disk, compression boards, etc.) and results are sent to the fault indication output.



The fault monitoring results are indicated by the LEDs on the recorder's front panel (example with 4 connected cameras). The LEDs are ON when all tests are correct and are flashing or OFF when a fault has been detected.

5 Services provided by Faiveley Transport

5.1 Documentation

Information necessary for installation, operation and maintenance of the XEBRA recorder is grouped in one document known as the "User's manual" containing the following subjects:

- Description of the XEBRA recorder (operation, technical data, mechanical and electrical interfaces)
- Installation and commissioning (fastening, wiring, configuration and tests)
- Operation (lights, HD cartridge, Ethernet port)
- First level maintenance (fault finding, replacement of the recorder and the HD cartridge, checks and servicing)
- Transport and storage conditions (for XEBRA and HD cartridge)
- Spare parts list

This document is available in French and in English. Translation into other languages is available as an option.

5.2 Training – option

Training sessions for XEBRA recorder and X-TRACK software can be provided by FAIVELEY TRANSPORT or one of its authorised agents:

- XEBRA operation
- Installation and commissioning
- Processing video sequences with X-TRACK
- First level maintenance
- Transport and storage

Training lasts one day with a qualified trainer for a maximum of 10 trainees, in English or in French, according to the terms and conditions of the commercial offer.

5.3 Installation - option

FAIVELEY TRANSPORT proposes complete installation of its video surveillance system in road or rail vehicles. This includes the following operations:

- wiring and fastening of all devices
- Setting of the cameras
- Configuration of XEBRA recorder
- Installation check

Installation is performed by FAIVELEY TRANSPORT or by one of its local authorised agents according to the terms and conditions of the commercial offer.

5.4 Installation check - option

FAIVELEY TRANSPORT can check the installation of the video surveillance system on the first vehicle:

- Fastening of XEBRA and cameras
- Wiring and connectors
- Position and orientation of the cameras
- XEBRA configuration
- Recording in normal mode and in alarm mode
- Processing of video sequences with X-TRACK

The check is performed by FAIVELEY TRANSPORT or by one of its local authorised agents according to the terms and conditions of the commercial offer.

5.5 Technical support

FAIVELEY TRANSPORT and its local authorised agents are available during business hours in order to answer your technical questions concerning XEBRA by phone or e-mail. If the technical support required is considerable, a commercial offer is submitted.

Additional technical data

1 Recorder data

1.1 Standards

Quality assurance

All FAIVELEY TRANSPORT activities are certified ISO 9001 by AFAQ. The XEBRA recorder is designed and produced in compliance with FAIVELEY TRANSPORT standards and methods.

Product standards

The recorder is compliant with the following standards:

	XEBRA for road vehicles	XEBRA for rail vehicles
Electrical environment	ISO 16750-2: Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 2: Electrical loads 2005/83/EC: European directive for "e" marking 10R02: United Nations regulation for "E" marking ISO 7637: Road vehicles—Electrical disturbance by conduction and coupling	EN 50 155 (December 2001): Electronic equipment used on rolling stock RIA 12: general specification for protection of traction and rolling stock electronic equipment from transient surges EN 50 121-3-2 (September 2000): Railway applications - Electromagnetic compatibility - Part 3-2: Rolling stock
Ambient temperature	EN 50 155: Electronic equipment used on rolling stock	EN 50 155: Electronic equipment used on rolling stock
Mechanical environment	EN 50 155: Electronic equipment used on rolling stock IEC 61 373: Railway applications - Rolling stock equipment - Shock and vibration tests	EN 50 155: Electronic equipment used on rolling stock IEC 61 373: Railway applications - Rolling stock equipment - Shock and vibration tests

The type test program and report are available in English and in French on request. Type tests will not be repeated.

1.2 Reliability and maintenance

MTBF

Estimated Mean Time Between Failures (MTBF) is **50 000 hours** for 4 and 6 cameras configuration and **40 000 hours** for 8 and 12 cameras configuration, without HD cartridge.

The standard used is MIL-HDBK-217 revision F with the following parameters (Gm: T=45°C, Gf: T=40°C, environment factor equal to square root of Gm x Gf).

Maintenance

Interval	Recommended operation	Average maintenance time
Once a year	Complete system test if the system is not connected to the board computer for centralised maintenance	-
Once a year	Cleaning of the fan depending on operating conditions	20 minutes
Every 3 years	Hard disk replacement	10 minutes

1.3 Recording time

The following tables are a summary of the minimum size of HD cartridges as a function of the number of cameras, the number of frames per second and the recording time requested.

Hypotheses

Image quality	Standard
Alarm duration	10 minutes
Number of saved alarms	2

For other cases, contact Faiveley Transport.

Size of HD cartridges (in Gb) depending on the recording time

Recording time 24 hours				
		Number of cameras		
	4	6	8	12
12 frames / s	40	40	40	60
25 frames / s	40	40	60	-
Recording time 72 hours				
		Number of cameras		
	4	6	8	12
12 frames / s	60	80	100	160
25 frames / s	80	120	160	-
Recording time 168 hours				
		Number of cameras		
	4	6	8	12
12 frames / s	120	160	240	320
25 frames / s	160	240	320	-

2 Interfaces

2.1 Inputs / outputs

Recorder power supply

XEBRA models	24V	24-52V	72-110V
Input voltage	24V	24V, 36V, 48V, 52V	72V, 96V, 110V
Power input	50 W	50 W	50 W
External protection	Fuse or circuit breaker mandatory, not supplied		
Insulation	None	1500Vdc	1500Vdc

Digital inputs / output

Two digital inputs (remote control):			
XEBRA models	24V	24-52V	72-110V
Galvanic insulation	None	1500Vdc	1500Vdc
Differential input	No	Yes	Yes
Voltage low/high/max level	<6V / >16V / 32V	<7V / >16V / 65V	<20V / >50V / 138V
Current at high level	5mA to 15mA	5mA to 15mA	5mA to 15mA
One digital output (fault indication):			
XEBRA models	24V	24-52V	72-110V
Galvanic insulation	No	1500Vdc	1500Vdc
Output type	1 powered open contact + one powered closed contact	1 dry contact open + 1 dry contact closed	1 dry contact open + 1 dry contact closed
Output voltage	11V to 13V	17V to 65V	50V to 138V
Maximum current	Resistive load 100mA	Resistive or inductive load 200mA	Resistive or inductive load 100mA
Built-in protection	Automatic resetting fuse	Fuse	Fuse

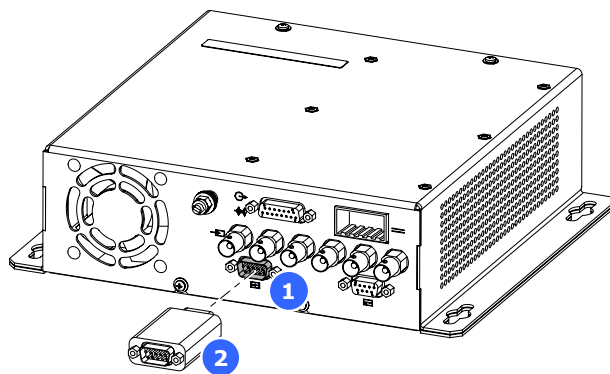
Video and sound inputs / outputs

Recorder output for camera supply	
Voltage	12V ± 1V
Available power	15W
Built-in protection	Automatic resetting fuse
Video input / video output	
Video standard	PAL / NTSC colours or black and white
Video signal	1Vpp synchronous negative polarity
Input / output impedance	75Ω
One sound input (only on XEBRA 6 and 12 camera models)	
Input level	150 to 450 mV
Input impedance	47 kΩ

2.2 Connectors

Function	Connector type
Supply and input / output connector	AMP connector type D3100
Maintenance connector	RJ45 (use a crossed Ethernet cable)
Connector for camera supply and sound input	SubD 15 pins female
Serial communication connector	SubD 9 pins male
Video connector	BNC

2.3 Serial communication



The recorder is equipped with a serial communication interface **1** that manages a communication line of RS485, RS422 or IBIS type.

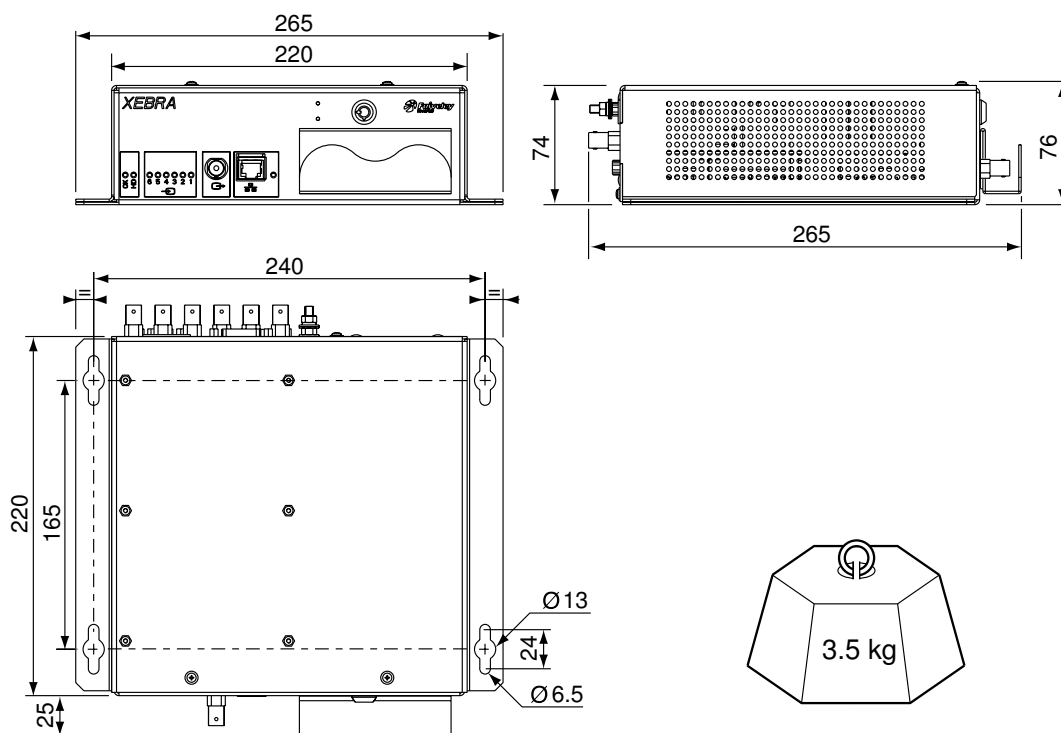
A RS422/IBIS external adapter **2** must be fitted to the interface for connection to an IBIS network.

This interface allows automatic management of the recorder's metadata (date, time, GPS coordinates, etc.)

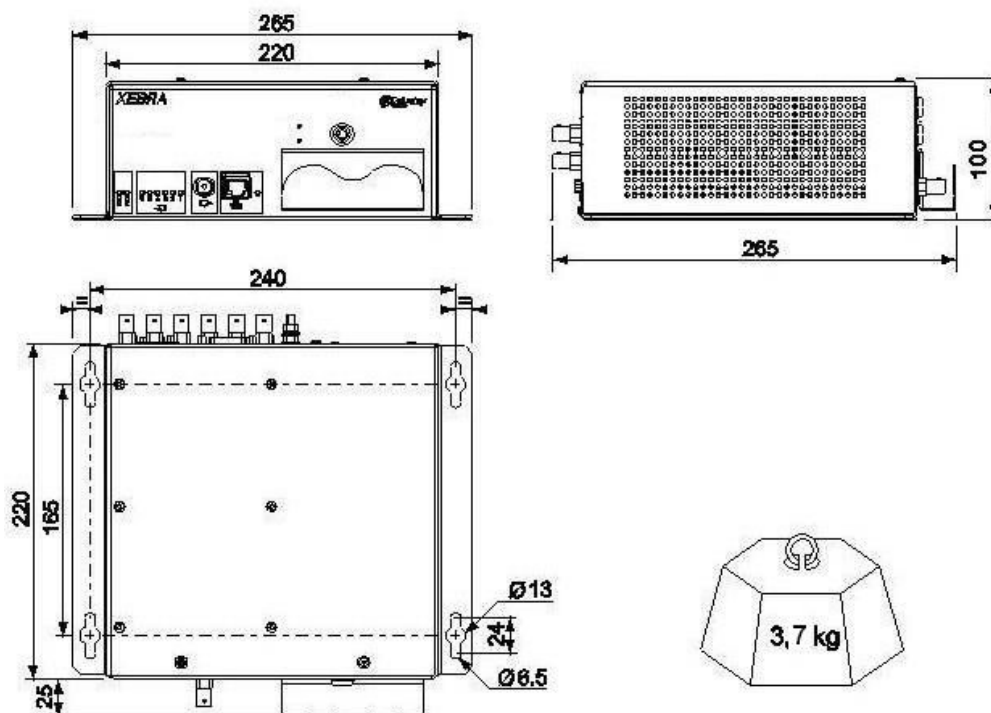
The software development of this protocol is performed on request and is not included in the standard XEBRA product.

3 Dimensions and weight

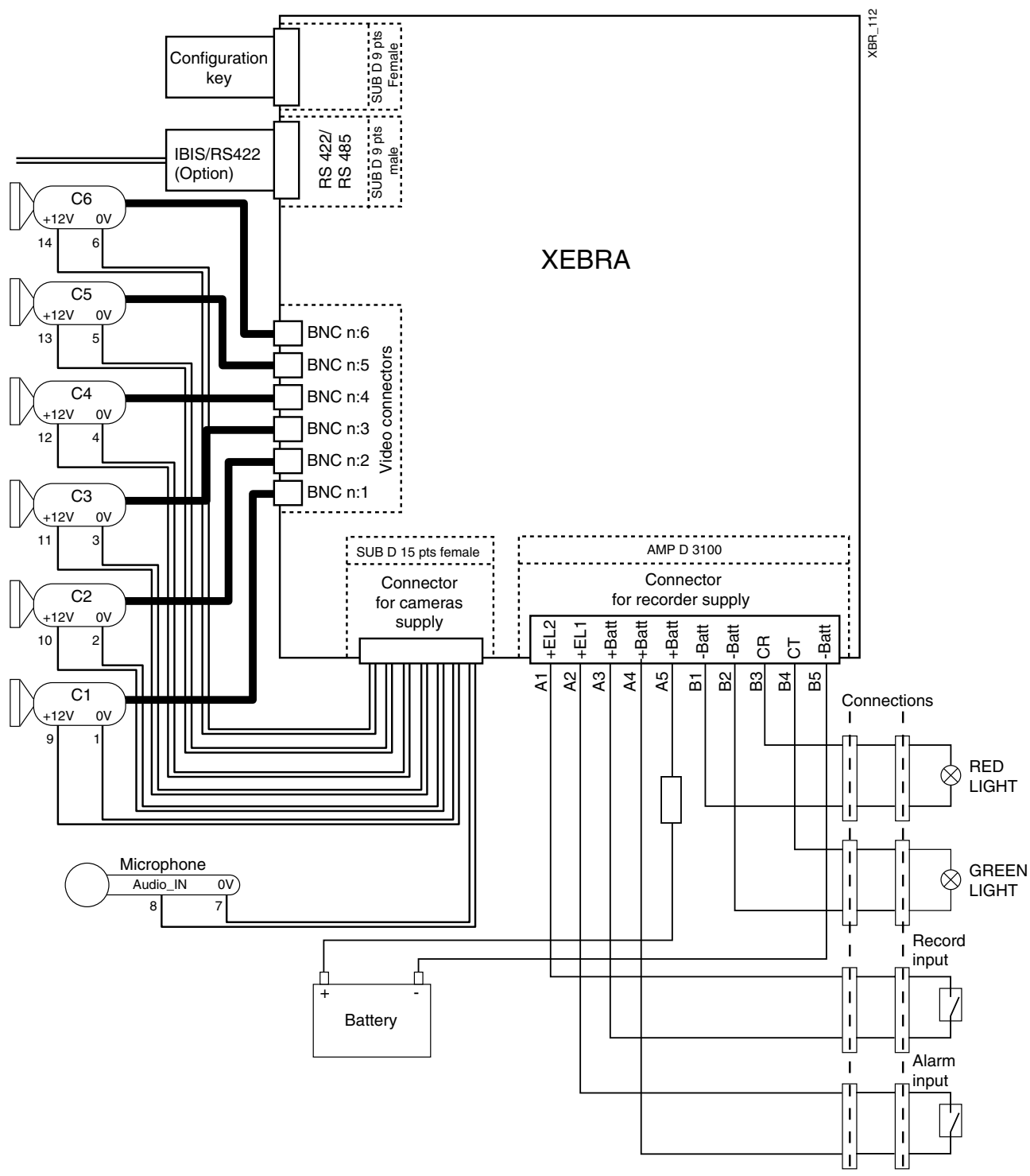
3.1 4 and 6 cameras video recorders



3.2 8 and 12 cameras video recorders



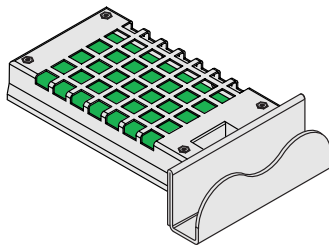
4 Wiring diagram



Example of a 6 cameras 24V recorder for road vehicles

5 Transport and storage

5.1 Hard disk handling precautions

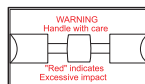
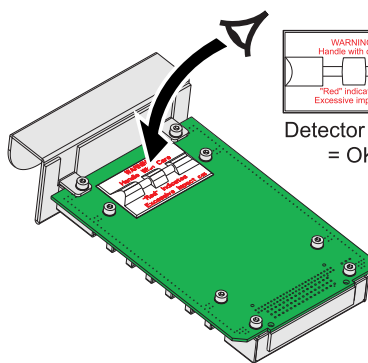


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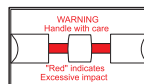


Cartridges containing hard disks are fragile and must be handled with care.

Protective suitcases have been specifically designed to avoid shocks when carrying these HD cartridges



Detector white
= OK



Detector red
= NOT OK

A detector checks after each handling and transport operation that the HD cartridge has not been knocked. The shock detector must be imperatively checked after extraction and before insertion of the HD cartridge in the recorder or the playback station.

5.2 Storage conditions

Recorders and HD cartridges must be stored in their original packaging. It is highly recommended to keep this packaging for subsequent use (transfer from one vehicle to another or return to Faiveley Transport for repair).

The equipment must be stored in a dry, dust free and well ventilated environment.

The equipment must be stored in a warehouse free from water, oil or salt water and toxic gasses (hydrogen sulphide, sulphurous acid, chlorine, ammonium, etc.).

Storage temperature without HD cartridge	-40°C to +85°C
Storage temperature of HD cartridge	-40°C to +65°C
Altitude	Up to 3000 m
Humidity	8% to 90% without condensation

6 Characteristics of configuration and playback PC

6.1 Configuration PC

The minimum characteristics required for the PC used to configure the recorder are:

- Pentium III, 600 MHz
- Windows 2000 or XP operating system
- Internet Explorer 6 or FireFox 1.0 browser
- J2SE Java Runtime Environment (JRE) version 1.4.2
- One port 10/100 baseT with a plug RJ 45
- A crossed Ethernet cable

6.2 X-TRACK playback station

The minimum characteristics required for the X-TRACK playback station are:

- Pentium IV, 1.5 GHz, 512 Mb RAM
- Windows XP operating system
- X-TRACK software
- One port 10/100 baseT with a RJ 45 plug
- A crossed Ethernet cable
- Display 17"
- CD or DVD drive / recorder

6.3 Laptop playback PC

The minimum characteristics required for the laptop playback PC are:

- Pentium IV, 1.3 GHz, 512 Mb RAM
- Windows XP operating system
- X-TRACK software
- One port 10/100 baseT with a RJ 45 plug
- A crossed Ethernet cable
- A CD drive

